Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of

Use of Spectrum Bands Above 24 GHz For Mobile Radio Services	)	GN Docket No. 14-177
Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands	)	IB Docket No. 15-256
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band	)	RM-11664
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services	)	WT Docket No. 10-112
Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations	)	IB Docket No. 97-95
Amendment of Part 101 to Facilitate Wireless Backhaul	)	WT Docket No. 10-153
Requests of Aviat Networks and CBF Networks, Inc. d/b/a Fastback Networks for Waiver of Certain Antenna Requirements in the 71-76 and 81-86 GHz Bands	)	WT Docket No. 15-244

COMMENTS OF COLLINEAR NETWORKS, INC. ON THE FURTHER NOTICE OF PROPOSED RULEMAKING

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SUMMARY

The Commission's regulatory framework established in 2003 in the 71-76 and 81-86 GHz bands (also referred to herein as the "70/80 GHz Bands") is working to stimulate innovation and greater deployment of high capacity, medium range fixed service links supporting a variety of communications solutions. Collinear Networks, Inc. ("Collinear Networks") has invested millions of dollars to advance the technology, design and development of equipment for fixed links in the 70/80 GHz Bands, with improved capacity, availability, and reliability as the result. Collinear Network anticipates introducing its equipment and solutions to U.S. markets in second quarter 2017, which will enable ultra-high bandwidth wireless links for point-to-point, relay, and mesh network and ring applications supporting delivery of mobile telecommunications services in other bands, fixed broadband connections, cable services extensions, multiple direct-to-enterprise applications, and other high-speed, low-latency solutions.

In the Further Notice of Proposed Rulemaking ("FNPRM") in this proceeding, the Commission seeks comment on a possible new rules which would establish a Spectrum Access System-based spectrum sharing regulatory framework into the 70/80 GHz Bands with the goal of facilitating the introduction of mobile services into the bands. The Commission's tentative proposal follows the Report and Order where it introduced new flexible use for mobile services in over 3 GHz of spectrum and designated 7 GHz of spectrum was for unlicensed use. A framework to introduce flexible mobile use applications in the 70/80 GHz Bands proposal received mild interest and little to no substantive support in the record in response to the Notice of Proposed Rulemaking. Such a framework would not serve the public interest. Moreover, the Commission's first SAS-supported spectrum sharing framework, in the so-called 3.5 GHz band,

which is very different than the 70/80 GHz Bands, has yet to be implemented and yet to be proven. To export such solutions to new and very different bands involving different technologies would be premature and it is unclear it can ever be supported. Further, the introduction of mobile services into the 70/80 GHz Bands would frustrate the investment of incumbents, manufacturers, and solutions providers, like Collinear Networks, that have relied on the existing, well established and well-crafted regulatory framework.

Use of the 70/80 GHz Bands has increased significantly in recent years. Even greater growth can be expected over the next three to five years given the growing need for the solutions medium-range high capacity fixed links make possible. This growth can occur provided there are no changes adversely affecting the use of the band for narrow beamwidth fixed links, such as the SAS-supported framework described in the FNPRM. In short, the proposal would prevent these bands from being put to their most effective uses.

Therefore, Collinear Networks submits that the Commission should decline to make any changes to the regulatory framework governing the 70/80 GHz Bands. Instead of introducing flexible use mobile services pursuant to an untested SAS concept, the Commission should promote the utilization of the bands for which it adopted new flexible mobile use rules in the Report and Order in this proceeding. The deployment of medium- and high-capacity short range services using smaller antennas should be encouraged in the 92-95 GHz band, and the antenna requirements for the 70/80 GHz Bands should not be altered. Finally, to meet the need for medium- and high-capacity short range links, the Commission should promote increased unlicensed use of the 57-71 GHz band.

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COMMENTS OF COLLINEAR NETWORKS, INC. ON THE FURTHER NOTICE OF PROPOSED RULEMAKING

Collinear Networks, Inc. ("Collinear Networks"), by its attorneys, hereby submits these comments on the Commission's Further Notice of Proposed Rulemaking in the above-captioned

proceedings.[1] Collinear Networks appreciates the opportunity to comment on the subjects raised in the *Further Notice.* As explained herein, the Commission's regulatory framework in the 71-76 and 81-86 GHz bands (also referred to herein as the "70/80 GHz Bands") is working to promote high capacity, medium range fixed communications. As explained herein, the proposals to establish a Spectrum Access System ("SAS")-based regulatory framework into the 70/80 GHz Bands to facilitate the introduction of mobile services into the bands would not serve the public interest but would prevent these bands from being put to their most effective uses. These proposals would frustrate significant investments in design and development in advanced, high-capacity fixed wireless communications made in reliance upon the current well-crafted regulatory framework. Collinear Networks submits that the Commission should decline to make any changes to the 70/80 GHz Bands in this docket and, instead, should promote the utilization of the bands for which it adopted new flexible mobile use rules in the *Spectrum Frontiers Report and Order* in this proceeding. Further, to meet the need for high-capacity short range links, the Commission should promote increased unlicensed use of the 57-71 GHz band and the deployment of medium- and high-capacity short range services using smaller antennas in the 92-95 GHz band.

I. INTRODUCTION AND STATEMENT OF INTEREST

A. Background

The Commission adopted the current regulatory framework in the 70/80 GHz Bands (as well as in the 92-95 GHz band) in 2003.[2] In its *70-80-90 GHz Report and Order*, the

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1 *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al.*, GN Docket No. 14-177, et al., *Report and Order and Further Notice of Proposed Rulemaking*, FCC 16-89 (rel July 14, 2016) (as applicable, "*Spectrum Frontiers Report and Order*" or "*Further Notice*" or "*FNPRM*").

2 *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz, and 92-95 GHz Bands*, WT Docket No. 02-146, *Report and Order*, FCC 03-248 (2003) ("*70-80-90 GHz Report and*

Commission sought to promote private sector investment in, as well as development and use of, the "millimeter wave" technology and equipment utilizing the 71-76 GHz, 81-86 GHz and 92-95 GHz bands (collectively, the "70-80-90 GHz Bands"). In particular, the Commission encouraged innovative uses of these bands by adopting a flexible and streamlined regulatory framework – nationwide, non-exclusive licensing with coordination and registration of individual links.

At the time the current framework was adopted, the Commission noted that it had not yet authorized the use of any frequency bands higher than 50.2 GHz and recognized that the technologies to exploit the new framework in the 70/80 GHz Bands commercially were not fully developed.[3] Yet the Commission had the clear foresight to recognize the potential for fixed operations in these bands not only to mature, but to have a material impact on the future of telecommunications. Therefore, the Commission's regulatory framework was designed to accommodate potential future developments in technology and equipment, as well as introduce competition in the communications services, equipment, and markets related to these bands. Specifically, the Commission sought to facilitate a broad range of new products and services, to enhance bandwidth for backhaul for high-speed wireless local area private and provider networks, and to promote backhaul and access to broadband services, including access systems for the Internet.[4] Further, because the 70/80/90 GHz Bands were (and are) allocated for both Federal and non-Federal services, the existing coordination framework was put in place to

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Order"). *See also Wireless Telecommunications Bureau Announces Permanent Process for Registering Links in the 71-76 GHz, 81-86 GHz, and 92-95 GHz Bands,* Public Notice, DA 05-311 (WTB BD 2005).

3 *See 70-80-90 GHz Report and Order* ¶¶ 3-4.

4 *Id.* ¶ 1.

advance spectrum sharing between commercial and other non-Federal Government operators and Federal Government systems.

The Commission was confident that it could accomplish these objectives in the 70/80/90 GHz Bands due to the propagation characteristics in this part of the radio spectrum. The bands are ideal for spectrum sharing and non-exclusive licensing for fixed links because small, cost-effective antennas can create extremely high gain and enable narrow beamwidths, thereby maximizing frequency reuse with minimal interference issues. Any potential interference issues are resolvable with straightforward coordination procedures. Under these conditions, these fixed links can operate over distances from hundreds of meters to several miles, depending upon power levels used and atmospheric effects. As a result, in these bands, a comparatively high density of high-capacity medium range links can be supported in any given area.

B. The Interest of Collinear Networks

The Commission's regulatory framework is succeeding in promoting investment, advanced design, and deployment in the 71-76 and 81-86 GHz bands. Thus, the objectives the Commission established over a decade ago remain valid, and the Commission's current regulatory structure is well-suited to achieve them. In fact, in response to the Commission's framework established for the 70/80 GHz Bands, and exploiting intervening technological breakthroughs funded by its investors, Collinear Networks was established in late 2013 to develop equipment and network solutions in the bands.

Indeed, in the past three years, Collinear Networks has invested millions of additional dollars in advancing the technology, design and development of equipment for fixed links in the 70/80 GHz Bands. Collinear Networks has partnered with a major developer and manufacturer of advanced technology systems to develop the technologies and enhance the capacity, availability, and reliability of fixed links using the 70 and 80 GHz band allocations. One of the

key breakthroughs Collinear Networks and its partner have made and are further developing is the effective means to address signal degradation with moderate to heavy rain so as to permit longer communications paths. Collinear Network anticipates introducing its equipment and solutions to United States markets in second quarter 2017. Collinear Networks continues to develop its equipment to achieve even greater performance and reliability. In brief, the emergence of Collinear Networks is an example of exactly what the Commission sought to promote when it adopted rules for the 71-76 and 81-86 GHz bands a decade ago.

Collinear will enable ultra-high bandwidth wireless links for point-to-point, relay, and mesh network and ring applications supporting delivery of mobile telecom services, fixed broadband connections, cable services extensions, multiple direct-to-enterprise applications, and other high-speed low-latency solutions. The 71-76 and 81-86 GHz bands are critical to Collinear Networks' solutions since they offer the best combination for both high bandwidth – up to 25 plus Gbps at present – and relatively long ranges, *e.g.*, up to six miles or even greater depending upon atmospheric conditions and availability requirements.

Operation under the current "light licensing" environment and existing technical and operational rules in the 70/80 GHz band will ensure both rapid deployment of Collinear Networks solutions to support customer needs and adequate interference protection for the links. Due to the current requirements for very narrow beamwidths in the Commission's rules for the 70/80 GHz Bands, multiple paths supported by Collinear Networks equipment and technologies, as well as those of other companies offering solutions in the bands, can coexist in the same local geographic area with minimal chance of interference. These antenna requirements give operators a high degree of confidence that they will be able to expand their operations to add new links. The ability to do so is critical to spurring further technological advances for

equipment and solutions in the bands. Relaxation of beamwidth requirements for terrestrial fixed services or the introduction of flexible use mobile services in the band seriously threatens to render the utilization of the band more expensive, *i.e.* lower the supportable capacity, availability, and range, diminish the potential utility of the band for the fixed links, as well as stymie future innovation.

II. THE COMMISSION SHOULD AVOID RULE CHANGES THAT FRUSTRATE THE PUBLIC INTEREST BENEFITS OF THE CURRENT REGULATORY FRAMEWORK

A. The Current Regulatory Framework in the 71-76 and 81-86 GHz Bands Is a Success, and Use of the Band under the Existing Regime Will Continue to Grow.

The Commission's regulatory framework for the 70/80 GHz Bands is a success whose benefits will become even more manifest in the next few years. Use of the band continues to grow steadily as reflected in the statistics reported by the Commission. In June 2014, the Commission noted that 270 nationwide licenses had been issued under Part 101 Subpart Q.[5] At the same time, the Commission also explained that those licensees had registered approximately 18,500 registered fixed links.[6] Two years later, those numbers have increased materially. The *Further Notice* states that as of June 10, 2016, there were 446 active non-exclusive licenses for the 70/80/90 GHz Bands, a rise of over 50%. Moreover, the Commission states that there were at least 22,600 registered links as of that date, based on a review of the database managers for the bands, representing an increase of more than 22%.[7]

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5 *See Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al.*, GN Docket No. 14-177, *et al.*, Notice of Inquiry, FCC 14-154, ¶ 76 (2014).

6 *Id.*

7 *Further Notice* ¶ 425.

Collinear Networks expects this trend to accelerate over the next three to five years, in part, fueled by the advent and then rollout of 5G services. As the Fixed Wireless Communications Coalition noted in its reply comments in response to the *Spectrum Frontiers Notice of Proposed Rulemaking*, "[t]he upward trend of incumbent Fixed Service operations will only continue once this band's full potential is realized."[8] High bandwidth wireless backhaul solutions with lengths of several miles with great availability and reliability will be absolutely critical to this infrastructure. As the only viable option to fiber where multi-Gbps speeds are needed over longer distances, wireless solutions enabled by the use of 71-76 and 81-86 GHz under the current regulatory framework will continue to become more and more valuable to the customers of providers that can deliver these services.

Accordingly, Collinear Networks submits that the Commission should promote continued expansion under the current framework rather than rush to rewrite the rules in the 70/80 GHz Bands to facilitate flexible use mobile allocation in a manner that follows the patterns of the recent Commission orders in other, very different frequency bands. In general, the Commission is certainly to be applauded for adopting regulatory innovations that increase the potential for sharing in various bands and more intensive use of spectrum by diverse types of services and uses. Collinear Networks agrees with the basic principles by which the Commission seeks to increase the potential for sharing in a band among diverse services when it makes sense. Yet, at this juncture, it remains to be seen how successful the Commission's recent decisions on sharing frameworks in other bands that form a basis for the *Further Notice's* proposals for the 71-76 and 81-86 GHz bands. And the potential for any band to support sharing to enable the introduction

[8] Reply Comments of the Fixed Wireless Communications Coalition, Filed in GN Docket No. 14-177, et al., at 3-4 (filed Jan. 5, 2016).

of new service types must be evaluated based on the likelihood and severity of impact to existing services and incumbents. The 70/80 GHz Bands are increasingly used for the purposes that the Commission sought to promote when it adopted the current rules, and future market developments are expected to multiply that use.

Nevertheless, in the *Further Notice*, the Commission seeks comment on the possible adoption of a three-tiered sharing framework in the 70/80 GHz Bands supported by a SAS.[9] The Commission patterns this proposal on its novel and recent adoption of a three-tiered sharing network in the 3.5 GHz band (*i.e.* 3550-3700 MHz).[10] Whether this new regulatory framework, supported by a SAS and environmental sensing capability, will be successful and support investment and wide deployment as the Commission hopes is far from guaranteed. The Commission has yet to choose the SAS Administrator(s) and will not, for some time, issue a license under the new regime. Until the SAS-supported regulatory framework is actually implemented at 3.5 GHz and has proven itself a success, which likely will not be manifest for a number of years, Collinear Networks submits that to consider adopting a similar framework in other, very different bands would not be in the public interest. This is especially the case in bands such as the 70/80 GHz Bands, where the existing regulatory framework is successfully promoting investment and innovation and fostering expanded deployment. An extension of a 3.5 GHz-band-like sharing framework into such a band at this time, or perhaps any other band, would be premature and should not be considered until meaningful experience is gained and

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9 *FNPRM* ¶ 440.

10 *Id. See also Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, *Report and Order and Second Further Notice of Proposed Rulemaking*, FCC 15-47, ¶ 45 (2015).

lessons are learned from actual deployment under that framework in its inaugural frequency band.

The Commission recognizes in the *Spectrum Frontiers Report and Order* accompanying the *Further Notice* that a multi-tiered network supported by a SAS is not a panacea to be used in all bands. The Commission declined calls to use such a framework in both the 28 GHz and 37 GHz bands as it adopted the new Upper Microwave Flexible Use Services ("UMFUS") in those bands.[11] The Commission not only cites the difficulties with "defin[ing] the specific rights held by the existing licensees, and work[ing] out rules for coordination with the existing licensees,"[12] but it also notes the importance of "adopting a balanced licensing approach that includes licensed, unlicensed, and innovative sharing approaches across a variety of bands."[13]

In the 70/80 GHz Bands there are already numerous licensees with deployments spread across the United States.[14] Not surprisingly, given that fixed links in this band are on the order of hundreds of meters to several miles, rather than being long haul, the deployments today are

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11 *Id.* ¶¶ 31 and 109. Referring to its choice of options concerning the 28 GHz band, the Commission noted that, "[i]n contrast, if we adopted a separate framework for mobile use of the band, we would need to develop a SAS, define the specific rights held by the existing licensees, and work out rules for coordination with the existing licensees. Adopting geographic area licensing for this band is also consistent with our goal of adopting a balanced licensing approach that includes licensed, unlicensed, and innovative sharing approaches across a variety of bands. For these reasons, we are not adopting a 3.5 GHz-style SAS framework for this band." *Id.* ¶ 31.

12 *Id.* ¶ 32.

13 *Id.* Moreover, it is the case that the fundamental technologies upon which the non-incumbent three-tiered approach in the 3.5 GHz band is based, IEEE 802.11x, were designed with other users and self-interference protection in mind. While the implementation of the 3.5 GHz band sharing framework will generate many challenges, the starting point was conducive to sharing among multiple tiers of users. The extension of such a 3-tiered, dynamic access approach to another band where technologies were not so designed from the start and services are extensively deployed already would pose the threat of a major impact to most existing and in-development equipment in the band.

14 *See, e.g., FNPRM* ¶ 432, Figure 3.

concentrated mainly in urban areas where density of demand is greatest.[15] Collinear Networks expects that this trend will continue on the whole, as indeed the spectrum demand that constitutes the so-called "spectrum crunch" is concentrated in the most densely populated areas. At the same time, Collinear Networks anticipates that over the next several years the density of fixed links operating in the 70/80 GHz Bands will rise in many geographic areas, both urban and rural.

This expected growth will be fueled by the robust ability of the 70/80 GHz Bands under the current framework to support a great variety of service applications relying on fixed links with high throughput, low latency, and increasing distances, especially where fiber deployment is infeasibile or is very costly. These applications include private line equivalents, private networks, and other applications for enterprises and other users with significant data needs; wireless backhaul for mobile service base stations operating in other bands; wholesale wireless backhaul for terrestrial wireline networks; cable service extensions; other relay and mesh network and ring applications on a wholesale basis or for large users; and communications links for high-altitude operations[16] are just some of the potential applications.

The regulatory framework in the 70/80 GHz Bands should remain unchanged at this time as a key component of a balanced licensing approach across multiple bands. In effect, because

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15 *Id.*

16 Google's recent experimental licenses in support of its reported development of high-altitude airborne platform experimentation seek authority to use, among other bands, 71-76 and 81-86 GHz. *See, e.g.*, File No. 0747-EX-PL-2015, issued to Google, Inc. (effective Mar. 17, 2016) (authorize experimental operations in 71-76 and 81-86 GHz bands at altitudes up to 75,459 feet). Under the ITU Radio Regulations, high altitude platform stations, or HAPS, are considered fixed services. *See, e.g.*, ITU Rad. Reg. 5.547 ("permit[s] the use of HAPS gateway links in the fixed service in the bands 6 440 - 6 520 MHz . . ."). Collinear Networks refers to the Google experimental licenses for purposes of illustrating that these bands may potentially serve as feeder links for high altitude platforms. Collinear Networks reserves comment on the parameters under which such feeder links may operate in terms of compatibility with terrestrial fixed links operating in the 70/80 GHz bands.

of the current operational and technical rules, these bands already demonstrate a high degree of sharing. Not only is there coordination between existing Federal (military fixed-satellite stations at military bases and radio observatories) and non-Federal users, but the large and increasing number of nationwide commercial fixed service licensees are already successfully sharing the band among themselves.

B. Sharing between Mobile Users and Primary Fixed Operations Is Not Readily Feasible Without Severely Impacting the Latter

Less than a year ago, in the *Spectrum Frontiers Notice of Proposed Rulemaking* initiating this proceeding, the Commission declined to propose that the 71-76 and 81-86 GHz bands be proposed for flexible mobile use.[17] The Commission correctly observed, referring to the 71-76 and 81-86 GHz bands, that the "interest among commenters [in response to its *Notice of Inquiry* in Docket 14-177] in using this band for mobile operations is rather limited."[18] The Commission also explained that "the coordination process between fixed and mobile operations would be considerably more complicated in these bands because there are multiple fixed licensees in a given area (as opposed to 28 GHz or 39 GHz, where there is one licensee in a given area and band),"[19] concluding that the record provided no clarity on how mobile units could be compatible with, or controlled to avoid interference to, fixed links.[20]

Nothing has materially changed to justify looking at possible use of the 71-76 and 81-86 GHz bands for flexible mobile use since then. If anything the prospects for introducing flexible

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17 *See Use of Spectrum Bands Above 24 GHz For Mobile Radio Services et. al*., GN Docket No. 14-177 *et. al*., Notice of Proposed Rulemaking, FCC 15-138, ¶ 87 (2015) ("*Spectrum Frontiers Notice of Proposed Rulemaking*").

18 *Id.* ¶ 86.

19 *Id.* The Commission also commented on the difficulties of protecting Federal earth stations and radio astronomy locations from mobile operations, which would require further limits on mobile operations in these bands. *Id.*

20 *Id.* ¶ 87.

mobile uses has become and will continue to become more difficult as increasing numbers of fixed links are deployed. The record generated by the *Spectrum Frontiers Notice of Proposed Rulemaking* did not provide any further clarity on how sharing could or even should be accomplished the 70/80 GHz Bands. Rather, the interest in mobile use of these bands remains lukewarm at best, as manifest by the comments filed in this docket. While the *Further Notice* cites several comments to suggest that there may be increased interest in these bands for mobile use, a review of those comments makes clear that these commenters offered little more than brief, passing references – typically no more than a sentence – regarding the prospects of mobile use in this band.[21] These snippets are based in virtually all cases on the fact that the 2015 World Radio Communications Conference identified the 70/80 GHz Bands, among numerous other bands, including many being addressed by the Commission in this proceeding, as a subject for further study for possible mobile use. Significantly, none of those commenters attempted to project, let alone justify, what the potential demand for mobile-use spectrum in the 70/80 GHz Bands might be, especially when taking into account the (then-proposed, now adopted) availability of the 28, 37, and 39 GHz bands for flexible mobile and fixed uses. Further, none of the commenters suggests how to overcome the significant challenges that would be created by allowing the new mobile users to share with existing fixed links under the current regime, let

[21] *See Further Notice* ¶ 430, n. 1141. *See also* ITU Resolution 238 (WRC-15), *resolves to invite ITU-R 2* (identifying the 70/80 GHz Bands as two of eleven possible candidate bands between 24 and 86 GHz for further study and consideration for mobile (i.e., international mobile telephony or IMT) use). ITU Resolution 238 expressly recognizes "that any identification of [any of these] frequency bands for IMT should *take into account the use of the bands by other services and the evolving needs of these services*; [and] that there should be no additional regulatory or technical constraints imposed to services to which the band is currently allocated on a primary basis." *Id., recognizing c) and d).*

alone in a regime that permits the continued expansion of the fixed licensee's operations to meet customer needs.

The one arguable (albeit mild) exception to this lack of enthusiasm – and dearth of detail – was Huawei. But Huawei in the end focused only on self-sharing and self-coordination between a mobile operator also deploying its own fixed links.[22] Whatever ability Huawei's hypothetical operator has to engineer and deploy mobile and fixed paths within its own network in a single band has little relevance to the prospects for sharing in a band among independent mobile and fixed operators each with their own business and network plans and operational needs to satisfy. As noted earlier, fixed service applications for this band are and will be increasingly varied, and certainly not in any appreciable measure limited to or characterized by self-provided wireless backhaul for mobile operators.

The goals of Collinear Networks and likely all other current vendors with equipment operating or about to operate in the 70/80 GHz Bands are increased data rates, with attendant improvements in availability and reliability, and over greater distances. Collinear Networks has made great strides in these areas pushing the state of the art for E-band equipment, and it is on the eve of commencing its roll out to customers. While there may be theoretical methods of combating at least some of the adverse effects of interference from incompatible mobile users, they would come with a significant cost, both in development and production costs, and in reduced performance, decreased data rates, shorter supportable distances, and reduced availability. Further, even to the extent these adverse effects could be addressed, a large re-investment cost and a significant delivery schedule slip would be required to continually try to

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[22] Comments of Huawei Technologies, Inc. (USA) and Huawei Technologies Co., Ltd., at 21-22, filed in GN Docket 14-177 *et al.* (filed Jan. 29, 2016) ("With these measured parameters, self-sharing with backhaul links is highly practical.")

adapt, for example, Field Programmable Gate Array ("FPGA") and Application Specific Integrated Circuit ("ASIC") designs to succeed in an environment where potential mobile interferers are operating. Collinear Networks has not included interference rejection mechanisms into its equipment design and development to handle a mobile interferer scenario, and it would venture to guess that other manufacturers have not either.

In sum, the comments cited by the *Further Notice* in support of the proposal it offers for the 70/80 GHz Bands provide no meaningful analysis and mention no technological methods which would enable successful sharing by flexible mobile users with fixed service licensees under the current regime, protecting existing links as well as permitting future growth. Given the relative absence in the record of demonstrated interest in these bands for mobile use, and the recent identification of several gigahertz of spectrum in other bands – the 28, 37, and 39 GHz bands – for flexible mobile use, and the prospect that one or more additional bands might be identified in response to the *Further Notice*, the Commission should not adopt its proposal for a three-tiered sharing framework, or any variation thereof, in the 70/80 GHz Bands.[23]

The extent to which the 28, 37, and 39 GHz bands can and will actually be utilized for flexible use purposes should be better understood, *and demonstrated*, before the Commission strikes out to refashion huge swaths of other fixed service bands for mobile use along similar or related lines.[24] Collinear Networks is concerned that the theoretical changes to the 70/80 GHz

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[23] Were the Commission nonetheless to adopt a plan to permit new flexible operations in the 71-76 GHz/81-86 GHz bands in the near future – which Collinear Networks reiterates it should not do – the Commission should protect fixed operations, and make provision for fixed licensees in the bands to expand their operations on a protected basis.

[24] As noted above, in the coming 5G era, the 71-76 and 81-86 GHz bands will be extremely important to ensure there is adequate spectrum for loner-range backhaul in support of next generation networks. Thus, Collinear feels that it would be much more prudent to promote flexible mobile use in bands such as 28 GHz, 37- 40 GHz that may become less capable of supporting future fixed bandwidth demands.

Bands on which the Commission seeks comment in the *Further Notice* would potentially create a framework that would be difficult to unwind with long-lasting adverse consequences running counter to its objectives when establishing the current and successful regulatory regime in the 70/80 GHz Bands. As a general matter, any rush to adopt sizable additional flexible use mobile regulatory frameworks to additional bands at this time may stifle emerging technologies and applications in the potentially affected bands. Consequently, to eliminate any prospect for a chilling effect in current innovation and deployment of fixed services in the 70/80 GHz Bands, the Commission should expeditiously terminate this portion of this proceeding described in Section V.A.7 of the *Further Notice* which will help promote continued expansion of and innovation in fixed services in these important bands.[25]

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[25] In the *Further Notice,* the Commission discusses as a predicate to its proposed modification to the regulatory framework in the 70/80 GHz Bands, the pending requests of Aviat Networks ("Aviat") and CBF Networks, Inc. ("Fastback") for certain waivers of the Part 101 rules governing antennas used in the bands. *See Further Notice* ¶ 436, *citing Wireless Telecommunications Bureau Seeks Comment on Requests of Aviat Networks and CBF Networks, Inc. D/B/A Fastback Networks for Waiver of Certain Antenna Requirements in the 71-76 and 81-86 GHz Bands*, WT Docket No. 15-244, Public Notice, FCC 15-1166 (2015) ("Antenna Waiver Notice"). The Commission notes in the Antenna Waiver Notice that there is also a comment-based request for the Commission to initiate a rulemaking on this matter. *Id.* at 9, *citing* Comments of the Fixed Wireless Communications Coalition in Response to the Commission's Notice of Inquiry, WT Docket No. 10-153 (filed Oct. 5, 2012); Letter from Mitchell Lazarus, Counsel for the Fixed Wireless Communications Coalition to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 10-153 (filed Apr. 4, 2013).

Aviat and Fastback seek waivers that would allow for smaller antennas with wider beamwidths (2.2 degree versus 1.2 degrees) in the 70/80 GHz Bands, claiming that such waivers are required to stimulate use of the bands for fixed links. Collinear Networks disagrees, and submits that the growing number of licenses and registered links, as well as its own experience, are proof that the existing regulatory framework and antenna rules have stimulated substantial investment and innovation, as well as deployment. The proposed waivers and requested rule changes are unnecessary to stimulate expanded use of the band by fixed links. Rather, the waivers would adversely affect the further deployment of narrow bandwidth links using improved technologies and remaining highly capable of sharing the bands consistent with the original motivation for establishing the current regulatory framework. In this, Collinear Networks largely concurs in the general position opposing the waiver requests, as well as the request for a rulemaking, taken by Dash Networks in response to the Antenna Waiver Notice. *See* Comments of Dash Networks, filed in WT Docket No, 15-244 (filed Nov. 12, 2015). To the extent there is a need for large bandwidth for short range, terrestrial back haul links

III. THERE IS NO NEED TO FACILITATE GREATER USE OF THE 71-76 AND 81-86 GHZ BANDS BY UNLICENSED OPERATIONS

The *Further Notice* also seeks comment on the feasibility of authorizing unlicensed, indoor-only operations in the 70/80 GHz Bands.[26] In 2003, when adopting the current regulatory framework, the Commission declined to authorize unlicensed use of any kind in the 70/80 GHz Bands for several reasons.[27] The Commission recognized the concerns of proponents of the current regulatory framework that equipment for contemplated licensed use in the 71-76 GHz and 81-86 GHz Bands were not being engineered for operation in the presence of unlicensed devices. The Commission concluded that such "an underlay of unlicensed devices [in the bands] could detrimentally affect the quality, and thus, buildout of service."[28] This is still the case today. There has been no reason for Collinear Networks to engineer its equipment for operation in such an environment, especially since the Commission, in the 2003 *70-80-90 GHz Report and Order*, chose to permit unlicensed, indoor operations in the 92-95 GHz band instead.[29]

Moreover, there are fourteen gigahertz of continuous spectrum just below the 70/80 GHz Bands that are available for both indoor and outdoor use. In the recent *Spectrum Frontiers Report and Order* adopted in this proceeding, the Commission designated the 64-71 GHz band

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from small cell base stations, the Commission should consider promoting the development and deployment of smaller antennas and wider beamwidths in other bands, such as the 57-71 GHz unlicensed bands or the 92-95 GHz band or even higher frequencies that would be more suitable for shorter haul (on the order of a few hundred meters or less) fixed links for high availability communications.

26 *Further Notice* ¶ 440 (*Indoor Usage*).

27 *70-80-90 GHz Report and Order* ¶ 41.

28 *Id.*

29 *Id.* ¶ 40. The Commission noted at the time that "we believe that the 92-95 GHz band will provide adequate spectrum to fill the immediate demand for unlicensed devices in millimeter wave bands." *Id.* ¶ 41.

for unlicensed operation in addition to the already existing 57-64 GHz band.[30] In light of the foregoing, and the lack of clarity in the record regarding the compatibility of unlicensed operations with the fixed-service equipment and applications that have been and are being developed for licensed use in the 70/80 GHz Bands, there is little basis or need for the Commission to consider designating the bands for unlicensed operations, even on an indoor-only basis.

IV. CONCLUSION

For the foregoing reasons, the Commission should decline to modify the regulatory framework in the 70/80 GHz Bands as proposed in the *Further Notice* at this time. To eliminate the potential for any adverse consequences for further development and deployment in the bands that may unintentionally have been created by the *Further Notice,* the Commission should expeditiously issue an order terminating this proceeding as it applies to the 70/80 GHz Bands.

Respectfully submitted,

COLLINEAR NETWORKS, INC.

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30 *See Spectrum Frontiers Report and Order* ¶¶ 125-131 and 325-352.